No. 661,262. Patented Nov. 6, 1900.

J. GEORGOFF.

AUTOMATIC REGULATOR FOR ATMOSPHERIC CAR BRAKES.

(Application filed July 28, 1900.)

(No Model.) 2 Sheets—Sheet 1.

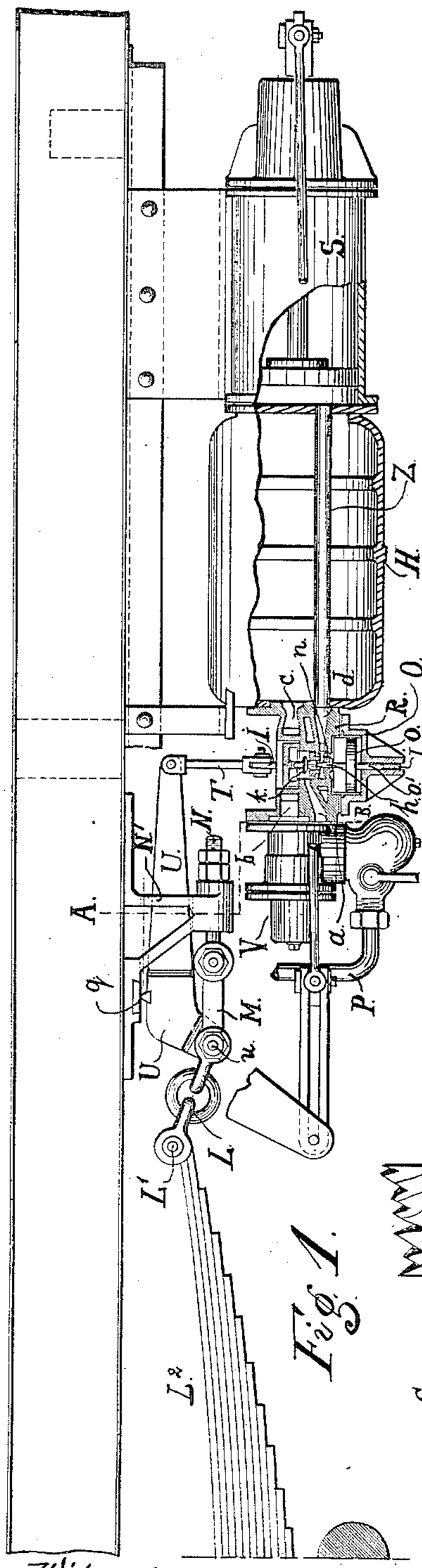

Fig. 1.

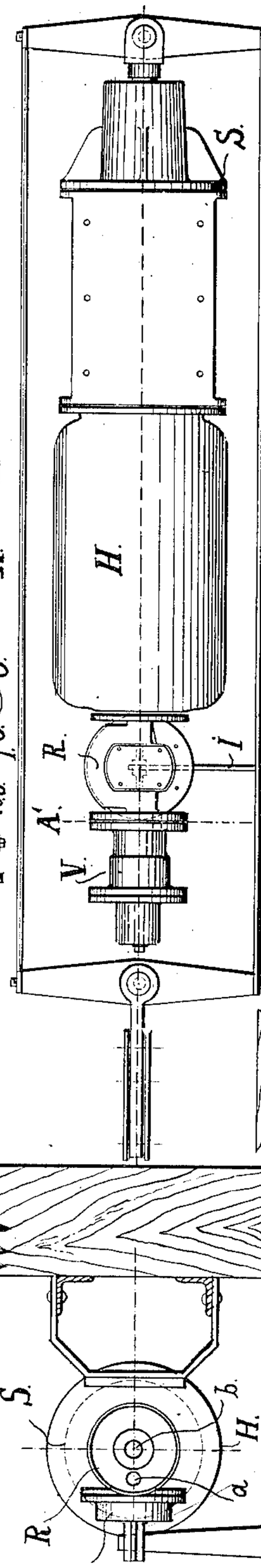

Fig. 2.

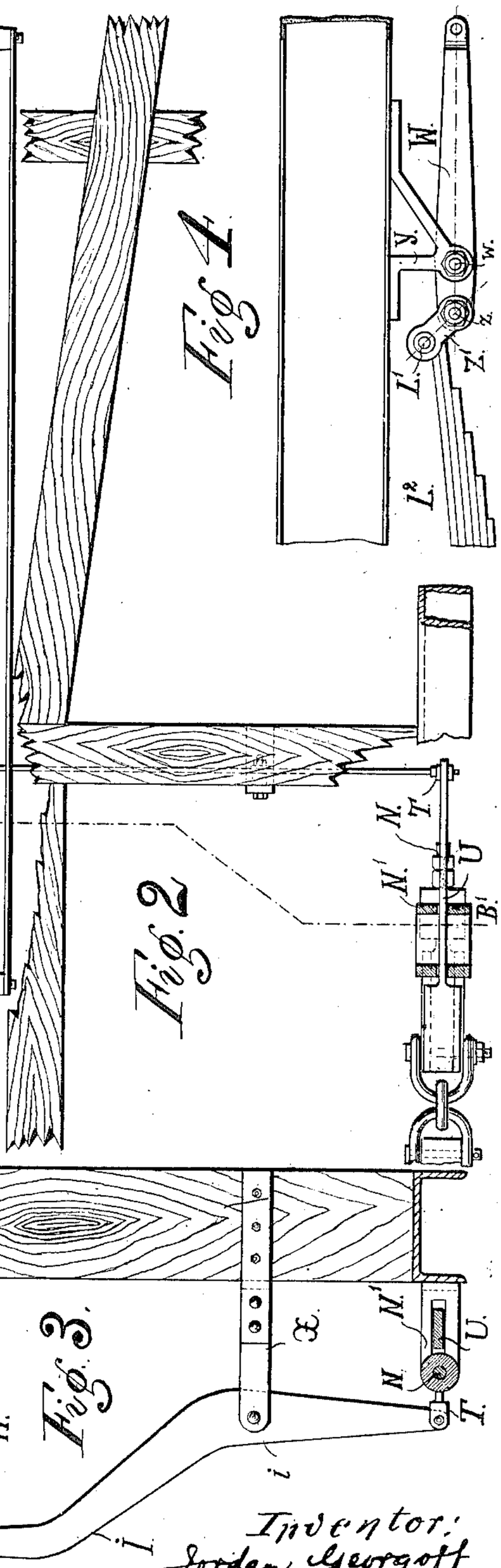

Fig. 4.

Fig. 3.

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Fig. 5.

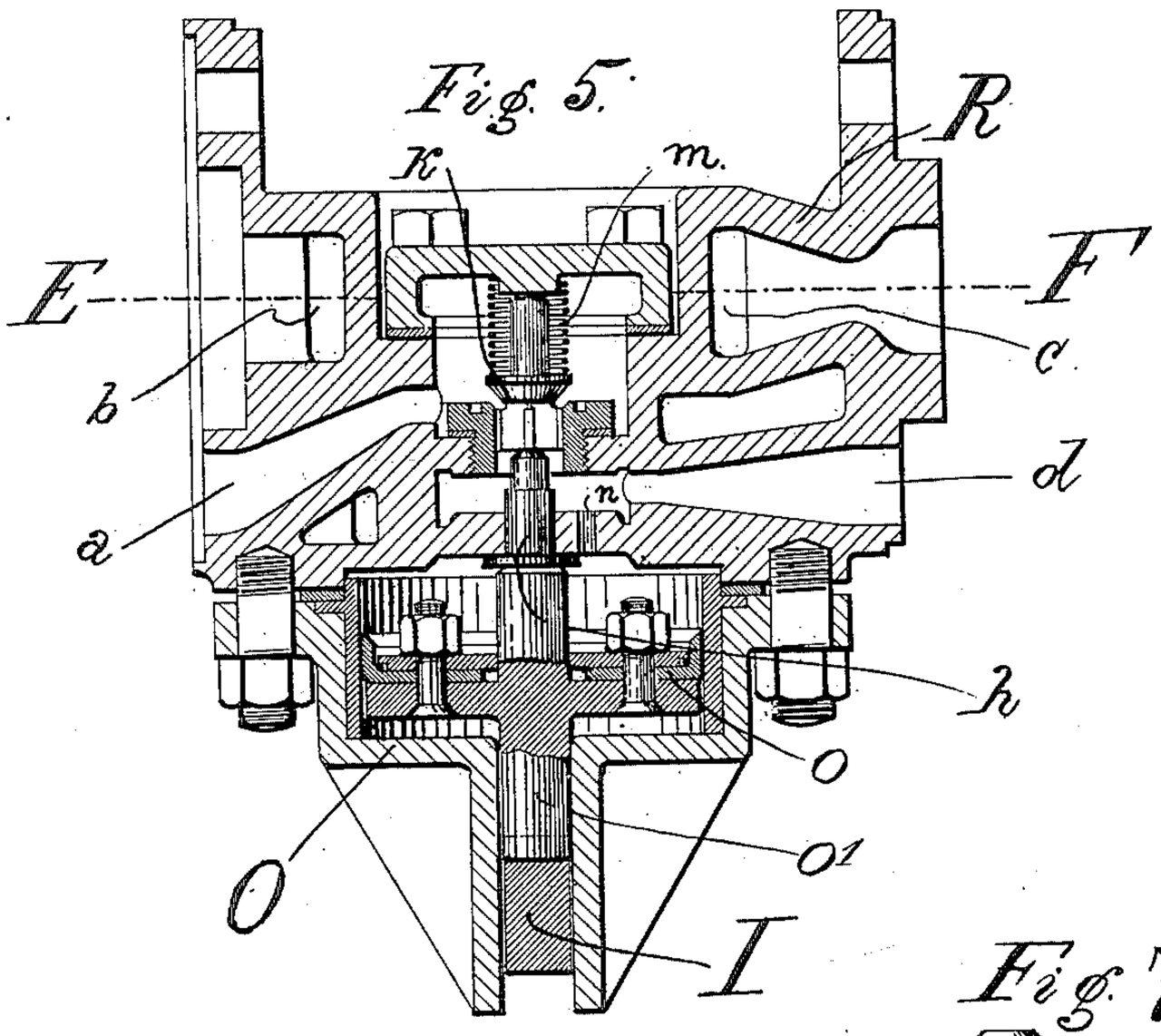


Fig. 7

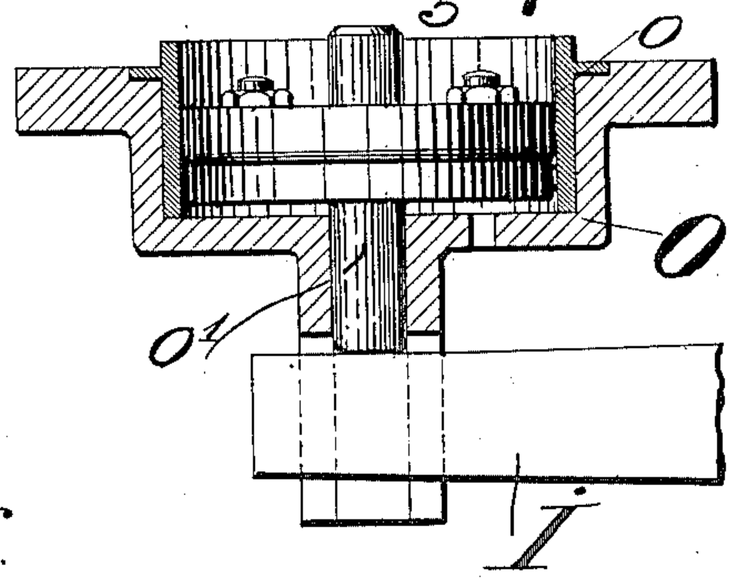
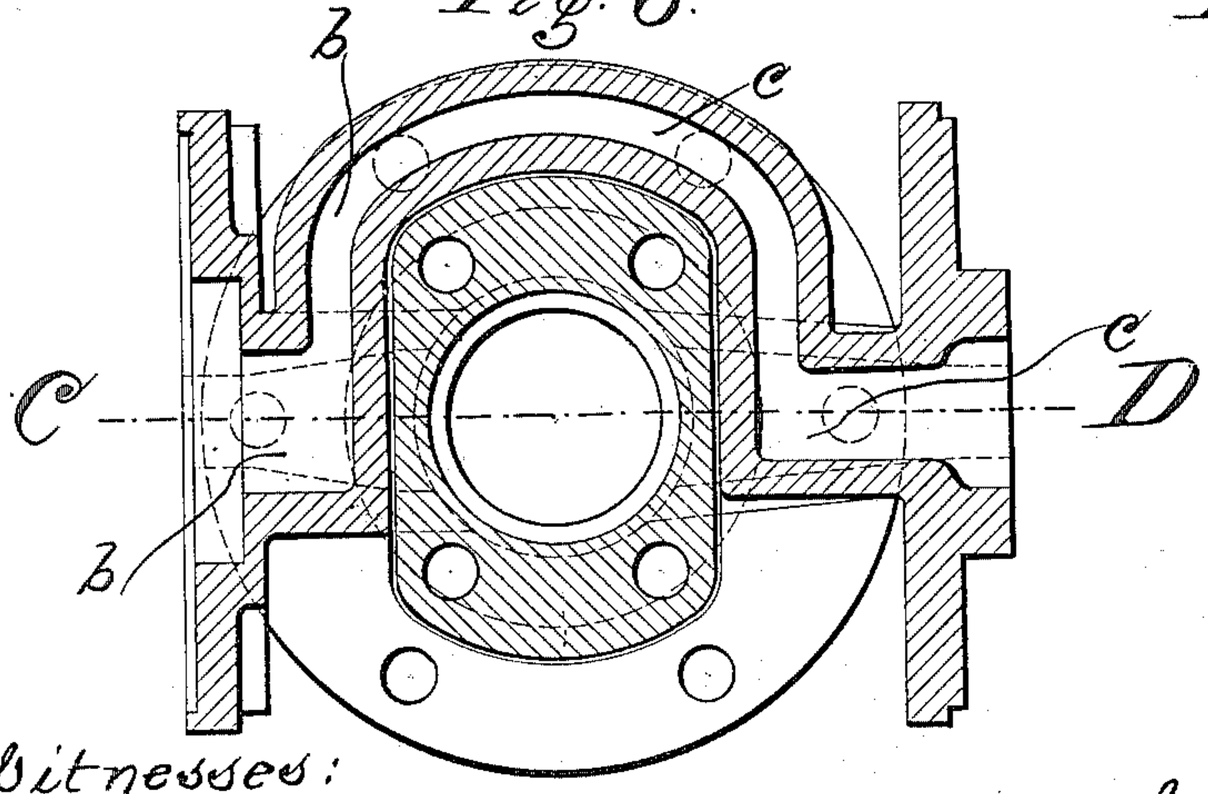


Fig. 6.



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UNITED STATES PATENT OFFICE.

JORDAN GEORGOFF, OF ST. PETERSBURG, RUSSIA.

AUTOMATIC REGULATOR FOR ATMOSPHERIC CAR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 661,262, dated November 6, 1900.

Application filed July 28, 1900. Serial No. 25,187. (No model.)

To all whom it may concern:

Be it known that I, JORDAN GEORGOFF, technologist, a subject of the Emperor of Russia, residing at St. Petersburg, in the Russian Empire, have invented certain new and useful Improvements in Automatic Regulators for Atmospheric Car-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to means for automatically regulating the maximum pressure that shall be exerted on the brake-piston of car-brakes from the air from the auxiliary reservoir.

The object of my invention is to provide a device on each car, either freight or passenger, automatically regulated to admit to the brake-cylinder more or less air, according to the weight of the car and its load.

My device, which acts in the said manner independently of the circumstance whether the pressure of air in the main air-pipe and auxiliary reservoir is the normal or a greater one, consists, generally stated, in having in the passage from the three-way valve to the brake-cylinder a valve, preferably a check-valve, that can be acted upon by a piston, so that upon a certain maximum pressure, depending upon the load, being attained in the brake-cylinder this valve will operate and close the passage to the brake-cylinder, preventing any greater braking force from being exerted.

My invention consists, further, in such other details of construction and arrangement, separately or in combination, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 shows the lower portion of a car-body with the usual automatic air-brake apparatus in plan, my new attachment being shown in section. Fig. 2 is a plan view of same. Fig. 3 shows the same in a cross-section on line A B of Fig. 1 or A′ B′ of Fig. 2. Fig. 4 shows a modification of the lever mechanism forming a part of my device. Fig. 5 shows my governor-valve-regulating mechanism separately in a vertical section on line C D of Fig. 6. Fig. 6 is a section of same on line E F of Fig. 5. Fig. 7 shows the lower portion of the valve-housing and piston arranged to operate therein in vertical section and turned on ninety degrees in reference to Fig. 5.

In the several views which show an apparatus embodying my invention, V represents the three-way valve employed in the Westinghouse air-brake system, H the auxiliary air-reservoir, and S the brake-cylinder, all of which operate in the usual manner well known in the art. P is a pipe which conducts the compressed air from the main air-pipe to the three-way valve. Interposed between the three-way valve and the said reservoir and cylinder is my improved regulating device R. A suitable housing is connected between the three-way valve and the auxiliary cylinder or reservoir, which housing has a passage-way *b c*, leading from the said valve into the auxiliary cylinder. This passage-way is curved, as shown in Fig. 5. The housing has another passage-way *a d*, leading from the said three-way valve to the pipe Z, that communicates with the brake-cylinder. In this latter passage-way is arranged a suitable valve, preferably a check-valve *k*, controlled, as usual, by a spiral spring *m*, which valve will act when closed to prevent the air from passing into the brake-cylinder from the three-way valve, but which will open and allow the air to pass out of the brake-cylinder when the pressure is relieved in the usual manner by the operation of the three-way valve.

To the lower part of the housing is connected a short cylindric chamber O. (Shown also separately on Fig. 6.) This cylinder contains a properly-packed piston *o*, secured to a piston-rod *o′*. Between the piston-rod *o′* and the check-valve *k* is interposed a rod *h*, that when the piston is in the upper position serves to retain the check-valve open, but when the piston is in its lower position allows the check-valve to be seated and close the passage-way into the brake-cylinder. The rod *h* may also form a prolongation of the piston-rod *o′* or be secured rigidly to it. The lower extremity of the piston-rod *o′* is in engagement with one end of a double-armed lever I, fulcrumed at *i* to a brace X, Fig. 3, rigidly secured to the frame of the car. On the opposite end of this lever I acts downwardly a certain pressure determined by the weight of the car. In order to utilize the weight of the

car and its load to act on the lever I, the latter is coupled by a link T to one end of the curved lever U, the opposite end of which is pivoted to the joining-pin *u* of the inclined spring-hanger L, with the link M pivoted to the draw-bolt N of the bracket N′, rigidly secured to the bottom of the car. On the lever U acts at *q* a predetermined part of the weight of the car and its load. Of course the piston-rod and piston are forced upwardly, and consequently the rod *h* will retain the check-valve open. On the other hand, the upper part of the short cylinder O communicates with the passage-way *d* through a passage-way *n*. The lower part of this cylinder—*i. e.*, the space below the piston—communicates to the atmosphere, as shown in Fig. 7.

The operation of my device is as follows: When the three-way valve is closed, a pressure of air is in the passage-way *b c* from the auxiliary reservoir; but there is no pressure in the passage-way *a d* leading to the brake-cylinder, and therefore no pressure will be exerted through the passage-way *n* on the upper surface of the piston *o*. Consequently the piston will be forced upwardly and retained in its upmost position, thus securing the check-valve *k* in the open position by weighted lever I and connected parts; but when the three-way valve operates to open communication from the auxiliary cylinder through the passage-way *b c* in the passage-way *a d* and brake-cylinder then a pressure will be exerted through the passage-way *n*, also on the upper surface of the piston *o*, thus providing a force tending to move the piston downwardly. When the pressure in the brake-cylinder in the passage-way *a d* and in the upper part of the cylinder O attains a certain height, so that the downwardly-acting force will be greater than the counter-pressure of the regulating-lever I, then the piston will be forced to its lower position and allow the check-valve *k* to seat itself and to close the passage of the air in the brake-cylinder. Upon this pressure in the passage-way *a* being relieved by the three-way valve the check-valve *k* will rise, and thus release the air from the brake-cylinder. Upon the pressure of air through the passage-way *n* thus being a little diminished the piston O will again rise and retain the check-valve in the open position, so that the air from the brake-cylinder can flow into the atmosphere without hindrance, and no braking pressure will be retained in the brake-cylinder. The attainable braking force of the air in the brake-cylinder depends upon the pressure of the weighted lever I. This lever can be weighted in any manner; but to obtain a device automatically regulated by the weight of the car I employ the specified lever mechanism I T U, adapted to a car with two or three pairs of trailing wheels on separate axles—*i. e.*, without trucks—the car having bow bearing-springs L^2, as shown by Fig. 1. In such a case it is usual to employ inclined spring-hangers L, one of which is shown on Fig. 1. The incline of a similar spring-hanger changes under each displacement of the end L′ of the spring, and with the incline of the spring-hangers changes evidently also the tension of same, produced by the variable reaction of the spring. Now, as such a displacement of the point L′ in reference to the car-body may happen for many reasons, (wear and tear of the axle-box, &c., substitution of same by a new one, modification in the attachment of the spring to the axle-box, &c.,) it is necessary to provide a device which allows to utilize only the vertical component force of the spring reaction, because this vertical component of the spring reaction changes only very slightly at every shock of the car in motion, (the greater the elasticity of the spring the less the alternations of this vertical force,) and represents therefore at any moment the load on one end of the spring. In order to obtain such effect, I employ the said short link M between the inclined spring-hanger L and the draw-bolt N and arrange the curved lever U so as to retain this link nearly horizontally. In consequence the link M receives the variable horizontal component force of the spring reaction, whereby the vertical component force which sensibly changes for a given car only with the load is transmitted by lever U and link T to the regulating-lever I and acts on the piston-rod *o′* in the desired and already specified manner.

On Fig. 4 is shown a simplified device to utilize only the vertical component force of the spring reaction. It consists of a double-armed lever W with a horizontal arm *z w*, the same being pivoted at *w* to the spring-bracket Y and coupled at one end to the inclined spring-hanger Z′ and at the other end to the regulating-lever by means of a link.

The proportions of the parts of my regulating device should be of course so regulated that under the normal pressure in the auxiliary reservoir the maximum load of the car will be just sufficient to secure the piston *o* continuously in its highest position, (shown on Figs. 1, 5, and 7,) thus allowing to admit into the brake-cylinder the maximum determined pressure proper for such load in the usual manner. Of course when the pressure in the auxiliary reservoir is for any reason greater than usual the check-valve *k* will nevertheless be seated at a braking pressure equal to the normal pressure in the auxiliary reservoir and main air-pipe.

I would have it understood that the essential part of my invention is a casing or housing with the check-valve, cylindric chamber, means for communicating the same with the brake-cylinder, and piston working in the said chamber and that the described lever mechanism which serves to transmit a definite part of the weight of the car and its load to act on the piston-rod of said piston may be varied at pleasure without departing from the spirit and purpose of my invention. I

would also remark that my device R may be mounted on the car-body separately from the three-way valve, auxiliary reservoir, and brake-cylinder and may be in such case set in communication with these parts of the braking mechanism by means of suitable flexible tubes or otherwise.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a car-brake with means for communication between the three-way valve and the auxiliary reservoir, and means for communication between the three-way valve and the brake-cylinder, of means for restricting the said means of communication with the brake-cylinder, means for closing said restricting means by a predetermined pressure in the brake-cylinder, a link interposed between the car-body and the end of a bow-spring supporting said car-body, and means for causing said link to retain said restricting means in the open position.

2. The combination in a car-brake with means for communication between the three-way valve and the auxiliary reservoir, and means for communication between the three-way valve and the brake-cylinder, of a check-valve located in said latter communication and arranged to be closed by the air flowing from the auxiliary reservoir into the brake-cylinder, a cylinder, a piston working in said cylinder and connected with said check-valve, means of communication between the said latter cylinder and said brake-cylinder for admitting air from the brake-cylinder to act on one side of said piston and cause it to move said check-valve to its closed position, and means for causing the weight of the car-body to act on said piston and check-valve and move them to open said check-valve.

3. The combination of a housing having two separate passages leading therethrough, a check-valve located in one of said passages, a cylinder connected with said housing, a piston working in said cylinder, a rod interposed between said piston and said check-valve, said housing having a passage-way communicating the said passage-way containing the check-valve with one end of said cylinder, said cylinder having a passage-way communicating its other end with the atmosphere, a piston-rod attached to said piston, a lever impinging on said piston-rod, and means for operating said lever from the weight of the car-body.

4. The combination in a car-brake, with means for communication between the three-way valve and the auxiliary reservoir, and means for communication between the three-way valve and brake-cylinder, of means for restricting said means of communication with the brake-cylinder, means for closing said restricting means by the predetermined pressure in the brake-cylinder, a link interposed between the car-body and the end of a bow-spring supporting the car-body, a lever fulcrumed on the car-body and having one end connected with said link, and means connecting the other end of said lever with said restricting means for causing the depression of said lever by the car-body to retain the restricting means in the open position.

5. The combination in a car-brake, with means for communication between the three-way valve and the auxiliary reservoir and means for communication between the three-way valve and the brake-cylinder, of means for restricting said means of communication with the brake-cylinder, means for closing said restricting means by a predetermined pressure in the brake-cylinder, a link interposed between the car-body and the end of a bow-spring supporting the car-body, means for moving the point of attachment of said link with the car-body in a direction toward and from said end of the bow-spring, a lever fulcrumed on the car-body and having one end connected with said link, and means connecting the other end of said lever with said restricting means for causing the depression of said lever by the car-body to retain the restricting means in the open position.

6. The combination in a car-brake, with means for communication between the three-way valve and the auxiliary reservoir, and means for communication between the said three-way valve and the brake-cylinder, of means for restricting the said means of communication with the brake-cylinder, a cylindric chamber, means for communication at one end of said chamber with the brake-cylinder, a piston working in said cylindric chamber, a rod attached to said piston, means for causing said piston to operate said restricting means, a double-armed regulating-lever, one end of which engages said piston-rod whereas the other end is coupled by a link to a lever interposed between the car-body and a bow bearing-spring and pivoted to the joining-pin of the links of the spring-hangers.

In testimony whereof I affix my signature in presence of two witnesses.

JORDAN GEORGOFF.

Witnesses:
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W. HEININGER.